

California Environmental Protection Agency



Vapor Recovery Test Procedure

TP- 201.1D

Pressure Integrity of
Drop Tube Overfill Prevention Devices

Adopted: February 1, 2001

Amended: July 3, 2002

**California Environmental Protection Agency
Air Resources Board**

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Drop Tube Overfill Prevention Devices**

Definitions common to all certification and test procedures are in:

D-200 Definitions for Vapor Recovery Procedures

For the purpose of this procedure, the term "CARB" refers to the State of California Air Resources Board, and the term "Executive Officer" refers to the CARB Executive Officer, or his or her authorized representative or designate.

1. PURPOSE AND APPLICABILITY

- 1.1** The purpose of this procedure is to quantify the pressure integrity of overfill prevention devices located in the Phase I product drop tube on two-point Phase I systems. It is also used to quantify the pressure integrity of spill container drain valves when the drain valve is installed so as to drain into the drop tube. This procedure is applicable only to those Gasoline Dispensing Facilities (GDF) equipped with an overfill prevention device located in the Phase I product drop tube. It is used during certification and to determine compliance of devices at installed gasoline dispensing facilities with the performance specification for the maximum allowable leakrate as defined in the Certification Procedure CP-201.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

- 2.1** A compatible product cap is modified to allow the introduction of nitrogen into the Phase I drop tube. A pressure-measuring device is connected to the modified cap. If the resulting measured nitrogen flowrate necessary to maintain a steady-state pressure of 2.00 inches H₂O is less than, or equal to, the maximum allowable leakrate the overfill prevention device is verified to be in compliance.
- 2.2** If the introduction of nitrogen, at a flowrate equal to the maximum allowable leakrate, does not result in a steady state pressure that meets, or exceeds, the value specified in CP-201, the Phase I product adaptor is inspected and tested. Any leaks attributable to the Phase I product adaptor are corrected and the test is repeated to ensure the measured pressure versus flowrate is attributable only to the overfill prevention device or, if applicable, the spill container drain valve.

3. BIASES AND INTERFERENCES

- 3.1** Missing or defective gaskets on the Phase I product adaptor, or a loose adaptor, may bias the results towards noncompliance. This bias is eliminated by testing the Phase I product adaptor for leaks prior to final determination of the compliance status of the overfill prevention device.
- 3.2** Refueling during the test may bias the results. No vehicle refueling or bulk deliveries to any of the tanks at the facility shall occur during this test.
- 3.3** Product levels less than four (4) inches above the highest opening at the bottom of the submerged drop tube may bias the test toward noncompliance.
- 3.4** Liquid levels in the drop tube that are above the location of the overfill prevention device will bias the results toward compliance. Ensure that the liquid level is below the overfill prevention device.
- 3.5** Leaks in the test equipment will bias the results toward noncompliance. Prior to conducting the test, this bias is eliminated by conducting a leak check of the test equipment. Leak detection solution may also be used during the test to verify the absence of leaks in the test equipment.
- 3.6** Use of this procedure to quantify the leak rate of spill container drain valves that drain liquid into the ullage of the storage tank, rather than into the drop tube, will yield invalid results.

4. SENSITIVITY, RANGE, AND PRECISION

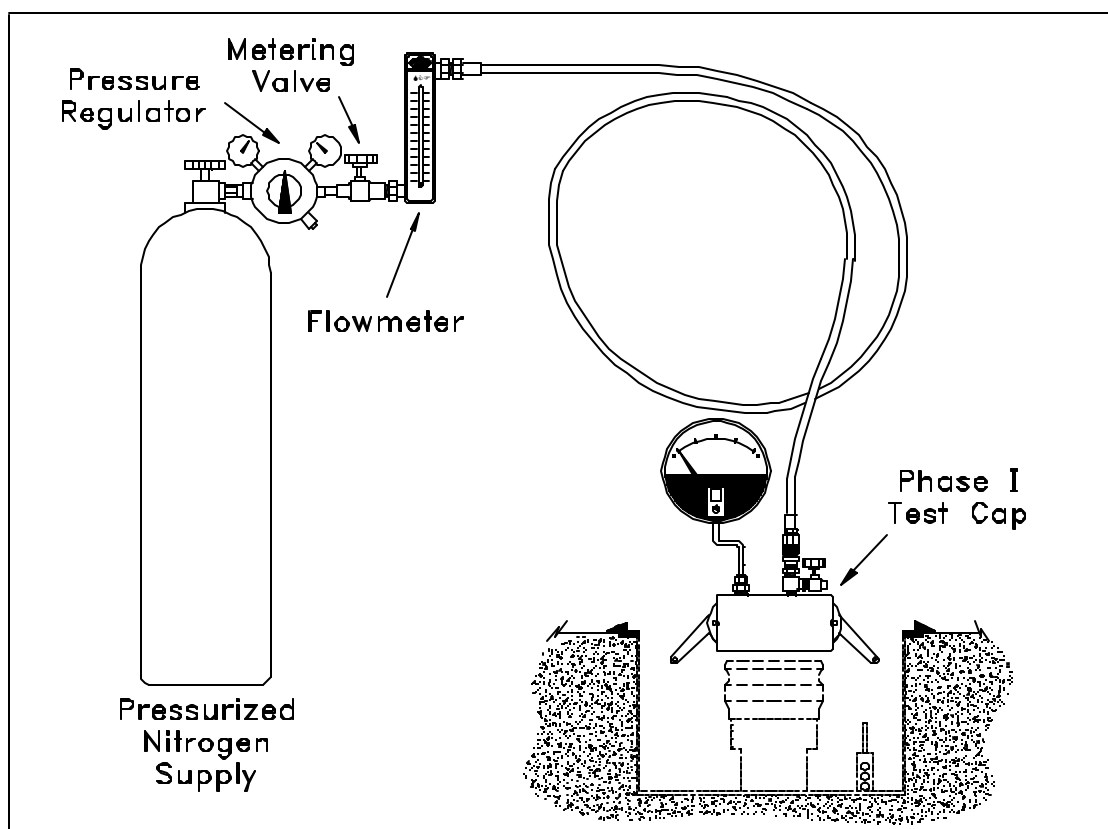
- 4.1** The measurable leakrates are dependent upon the range of the flowmeter used for the test. The recommended flowmeter range specified in Section 5.1 provides sufficient precision at the maximum allowable leakrate defined in CP-201.
- 4.2** The sensitivity of the pressure measuring device is 0.01 inches H₂O for electronic pressure measuring devices and 0.05 inches H₂O for mechanical pressure gauges.

5. EQUIPMENT

- 5.1** Drop Tube Pressure Integrity Assembly. Use a product cap compatible with the Phase I product adaptor. The cap shall be equipped with a pressure tap and a flowmeter capable of measuring flowrates equal to the maximum allowable leakrate specified in CP-201 and three times the maximum allowable leakrate. The maximum allowable full-scale range for the flowmeter shall be 1.0 CFH. The flowmeter shall be calibrated for use with nitrogen. An example of a complete Drop Tube Pressure Integrity Assembly is shown in Figure 1. An example of a Product Cap Test Assembly is shown in Figure 2.
- 5.2** Pressure Measuring Device. Use a pressure-measuring device to monitor the pressure in the drop tube.

- 5.2.1 If an electronic pressure-measuring device is used, the maximum fullscale range of the device shall be 10 inches H₂O. The minimum accuracy shall be 0.5 percent and the pressure measuring device shall be readable to the nearest 0.01 inches H₂O.
- 5.2.2 If a mechanical pressure-measuring device is used, the maximum fullscale range shall be 5 inches H₂O. The minimum accuracy shall be 1.0 percent and the minimum graduations shall be 0.05 inches H₂O. The minimum diameter of the pressure gauge face shall be 4 inches.

Figure 1
Drop Tube Pressure Integrity Assembly

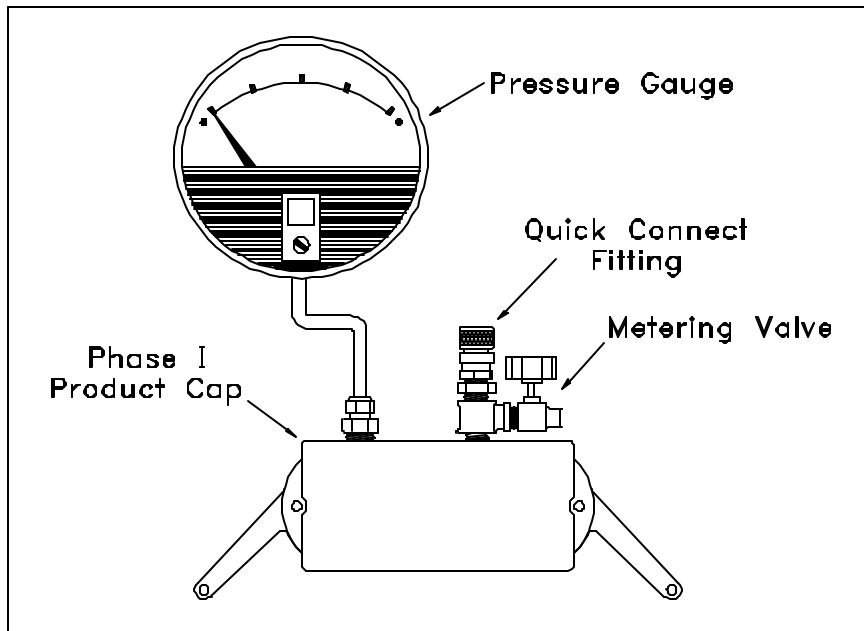


- 5.3 Nitrogen. Use commercial grade gaseous nitrogen in a high-pressure cylinder, equipped with a two-stage pressure regulator and a one psig pressure relief valve.
- 5.4 Stopwatch. Use a stopwatch accurate to within 0.2 seconds to time the duration of the test.
- 5.5 Leak Detection Solution. Any commercial liquid solution designed to detect vapor leaks may be used to verify the pressure integrity of the Phase I product adaptor during this test.
- 5.6 Vapor Poppet Pressure Relief Assembly. Use an assembly to open the Phase I vapor

poppet during the test. This will ensure that the pressure on the underground storage tank (UST) side of the overfill prevention device is at zero gauge. An example of a Vapor Poppet Pressure Relief Assembly is shown in Figure 3.

- 5.7** Inflatable Plumber' Bladder. Use a "3-4" inch diameter inflatable plumber's bladder and extension hose equipped with a safety chain, as shown in Figure 4, to isolate the drain valve from the Overfill Prevention Device when applicable. The safety ring must be removable, allowing the tester to remove the ring following inflation and attach the ring prior to deflation.
- 5.8** Traffic Cones. Use traffic cones to encircle the area containing the Phase I manholes while the test is being conducted.
- 5.9** Tank Gauging Stick. Use a tank gauging stick of sufficient length to verify that the UST liquid level is at least four (4) inches above the highest opening at the bottom of the submerged drop tube. The tank gauging stick shall be equipped with a non-sparking "L" bracket at the end.

Figure 2
Product Cap Test Assembly

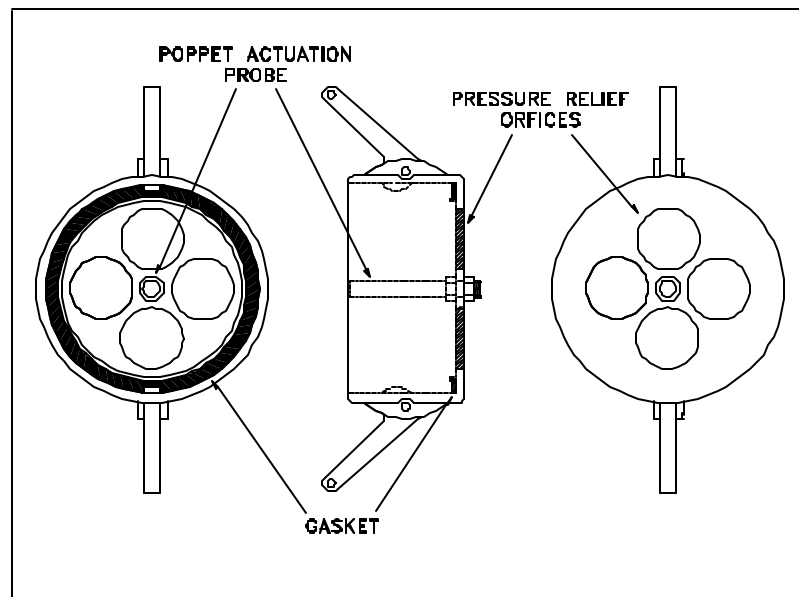


6. PRE-TEST PROCEDURES

- 6.1** The flowmeter and pressure-measuring device shall be calibrated within the 180 days prior to conducting the test. The flowmeter(s) shall be calibrated for use with nitrogen. Calibrations shall be conducted in accordance with EPA or CARB protocols. CARB calibration methodology for flowmeters are contained in Appendix D of Air Monitoring

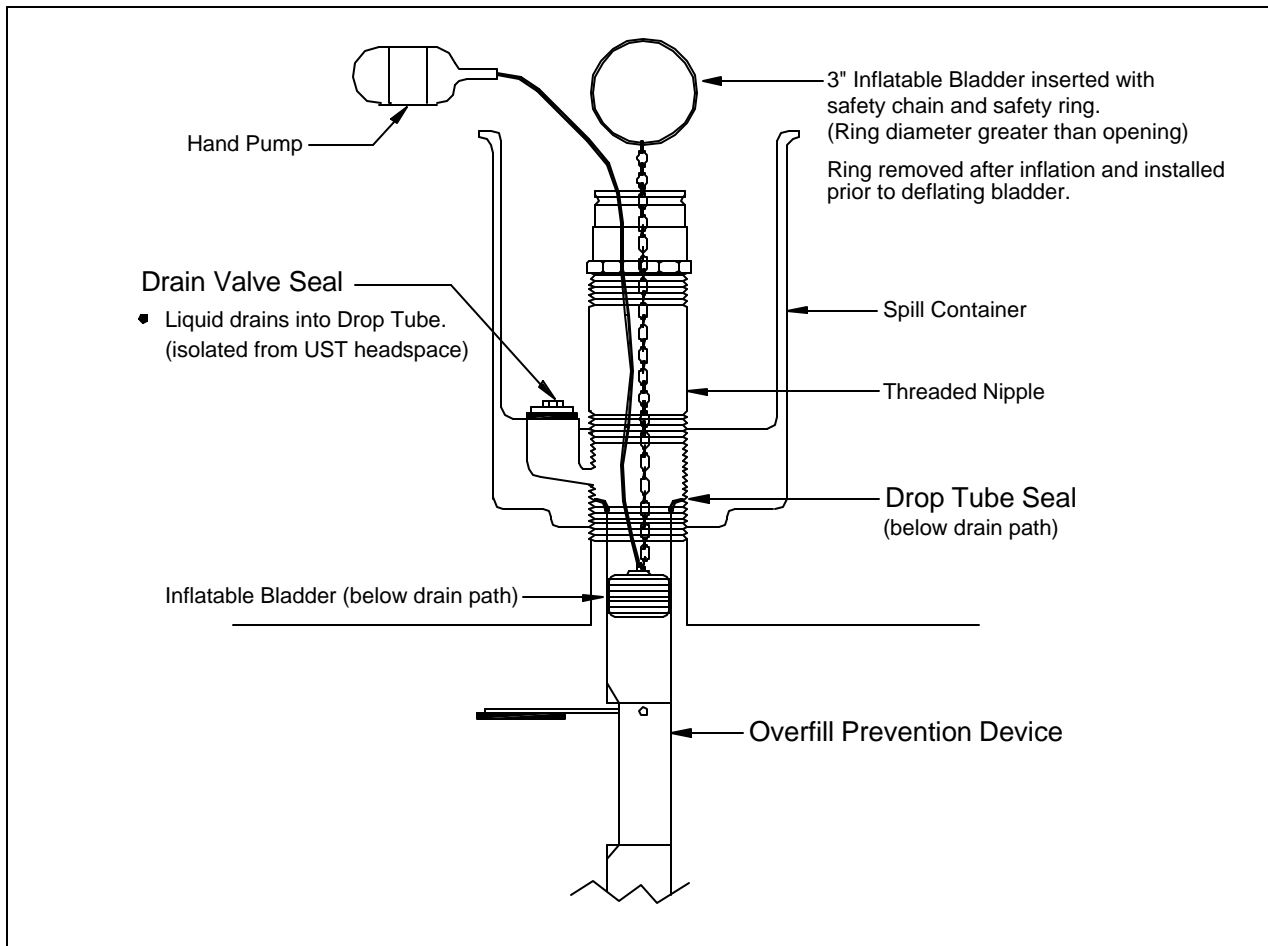
- 6.2 Place the traffic cones around the perimeter of the Phase I spill containers, allowing sufficient space to safely conduct the test.
- 6.3 Remove the lids of the Phase I spill containers. Visually determine that the drop tube is equipped with an overfill prevention device. If the drop tube is not equipped with an overfill prevention device, and the drain valve does not drain into the drop tube, the test will only quantify leaks that occur at the Phase I adaptor.
- 6.4 Inspect the Phase I product adaptor to ensure that the gasket is intact and that the adaptor is securely attached to the Phase I product stem.
- 6.5 Verify that the liquid level in the storage tank is at least four (4) inches above the highest opening at the bottom of the submerged drop tube using the tank gauging stick.

Figure 3
Vapor Poppet Pressure Relief Assembly



- 6.6 Inspect the drain valve configuration. Determine whether the drain valve drains liquid directly into the drop tube above the Overfill Prevention device, as shown in Figure 4, rather than into the underground storage tank ullage space. If the drain valve drains into the drop tube, the procedure will quantify the leak rate through both the Overfill Prevention Device and the drain valve, and the maximum allowable leak rate for both devices is the sum of the two individual leak rates.

Figure 4
Inflatable Bladder Installation



7. TEST PROCEDURE

- 7.1 Connect the Drop Tube Pressure Integrity Assembly to the Phase I product drop tube as shown in Figure 1. Connect the nitrogen supply line to the inlet of the flowmeter.
- 7.2 Connect the Vapor Poppet Pressure Relief Assembly to the Phase I vapor poppet to bring the UST headspace to atmospheric pressure.
- 7.3 With no vehicle refueling occurring, open the nitrogen supply and adjust the nitrogen flowrate to at least three times the maximum allowable leakrate specified in CP-201, and start the stopwatch.
- 7.4 Wait until the pressure measuring device records a pressure between 2.00 and 2.20 inches H₂O.

- 7.4.1 If the pressure does not reach at least 2.00 inches H₂O within 180 seconds, the Drop Tube assembly does not comply with the maximum allowable leakrate.
 - 7.4.2 If the pressure reaches at least 2.00 inches H₂O, reduce the introduction of nitrogen to the allowable leakrate specified in CP-201. Wait until the pressure reaches steady state conditions for at least thirty (30) seconds and record both the nitrogen flowrate and the steady state pressure. If the steady state pressure is less than 2.00 inches H₂O, the Drop Tube assembly does not comply with the maximum allowable leakrate.
- 7.5** Determine the leak rate through the drain valve alone, if applicable. This step may be used if the assembly did not meet the maximum allowable leak rate and to verify if the leak is attributed to the drain valve or the overfill prevention device.
- 7.5.1 Remove the Product Test Cap from the product adaptor.
 - 7.5.2 Carefully install an inflatable plumber's bladder ("3 - 4" inch model) into the drop tube as shown in Figure 4 and inflate. Once inflated, carefully remove the safety ring allowing the chain to rest on top of the bladder and reinstall the Product Test Cap. The drain valve is now isolated from the overfill prevention device.
 - 7.5.3 Conduct the procedure pursuant to sections 7.1 through 7.4.
 - 7.5.4 Care must be taken to ensure that the safety ring is installed prior to deflating the bladder to avoid the bladder from falling down into the drop tube.

8. POST-TEST PROCEDURES

- 8.1 Carefully remove the Drop Tube Pressure Integrity Assembly and the Vapor Poppet Pressure Relief Assembly from the Phase I connections.
- 8.2 Reinstall the safety ring and deflate the inflatable plumbers bladder.
- 8.3 Replace the caps on the appropriate Phase I adaptors, and the appropriate lids on the spill containers.
- 8.4 Remove the traffic cones from the Phase I area.
- 8.5 If the steady-state pressure, at a nitrogen introduction rate equal to the allowable leakrate, was not equal to 2.00 inches H₂O, use Equation 9-1 to determine the leakrate at 2.00 inches H₂O.

9. CALCULATING RESULTS

- 9.1 If the flowrate of Nitrogen was at the upper limit of the flowmeter and the measured pressure never reached 2.00 inches H₂O, but was greater than 0.0 inches H₂O, the actual leakrate at a pressure of 2.00 inches H₂O shall be calculated as follows:

$$Q_{2.00} = (2.00)^{1/2} \left[\frac{Q_{\text{actual}}}{(P_{\text{actual}})^{1/2}} \right] \quad \text{Equation 9-1}$$

Where:

- $Q_{2.00}$ = The leakrate of the drop tube assembly at 2.00 inches H₂O, cubic feet per hour
- Q_{actual} = The actual introduction rate of nitrogen, cubic feet per hour
- P_{actual} = The actual measured steady-state pressure at Q_{actual} , inches H₂O
- 2.00 = Pressure, inches H₂O

10. REPORTING RESULTS

- 10.1** Report the results of the quantification of the leakrate through the drop tube overflow prevention assembly as shown in Form 1.

11. ALTERNATE PROCEDURES

- 11.1** This procedure shall be conducted as specified. Modifications to this test procedure shall not be used to determine compliance unless prior written approval has been obtained from the ARB Executive Officer, pursuant to Section 14 of Certification Procedure CP-201.

Form 1
Field Data Sheet
Drop Tube Overfill Prevention

Facility:	Test Date:	Tester(s):
Address:	City:	Zipcode:
Make & Model of Overfill Prevention:		Phase II System Type:
Date of Last Flowmeter Calibration:	Date of Last Pressure Device Calibration:	

Test Results

Product Grade	N ₂ Flowrate (Overfill Only) (CFH)	Pressure (in. H ₂ O)		N ₂ Flowrate (Overfill + Drain Valve) (CFH)	Pressure (in. H ₂ O)	N ₂ Flowrate (Drain Valve Only) (CFH)	Pressure (in. H ₂ O)	Difference (Overfill Leakrate) (CFH)

<i>Comments:</i>